

WHAT IS CLAIMED IS:

1. A method for assembling a variable vane assembly for a gas turbine engine including a casing and an inner shroud, said method:

providing at least one variable vane including a radially inner spindle that includes a groove defined therein that has at least one machined face;

coupling the variable vane radially between the casing and the inner shroud such that at least a portion of the radially inner spindle is inserted at least partially through an opening extending radially through the inner shroud; and

securing the variable vane to the inner shroud by engaging the spindle machined face with a retainer coupled to the inner shroud.

2. A method in accordance with Claim 1 wherein securing the variable vane to the inner shroud by engaging the spindle machined face with a retainer further comprises coupling the retainer to the inner shroud to facilitate preventing rotation of the inner shroud with respect to the variable vane.

3. A method in accordance with Claim 1 further comprising coupling a bushing including a base and a body extending radially from the base to the inner shroud and the variable vane such that the bushing body extends circumferentially around at least a portion of the variable vane radially inner spindle, and wherein the bushing base has a different cross-sectional profile than that of the bushing body.

4. A method in accordance with Claim 3 wherein at least a portion of the inner shroud opening has a cross-sectional profile that is substantially similar to that of the bushing base and wherein a portion of the inner shroud opening has a cross-sectional profile that is substantially similar to that of the bushing body, wherein coupling a bushing including a base and a body further comprises inserting the bushing within the inner shroud opening to facilitate preventing rotation of the bushing with respect to the variable vane.

5. A method in accordance with Claim 1 wherein securing the variable vane to the inner shroud by engaging the spindle machined face with a retainer further comprises inserting the retainer at least partially through an opening that extends axially at least partially through the inner shroud.

6. A variable vane assembly for a gas turbine engine including a casing, said variable vane assembly comprising:

a variable vane comprising a radially inner spindle and a radially outer spindle, said radially inner and outer spindles configured to rotatably couple said vane within the gas turbine engine, at least one of said radially inner and radially outer spindles comprises at least one groove defined therein, said at least one groove comprising at least one machined face; and

a retainer for engaging said groove at least one machined face to securely couple said variable vane within the gas turbine engine, said retainer is configured to facilitate reducing wear of said variable vane.

7. A variable vane assembly in accordance with Claim 6 wherein said retainer is further configured to contact at least two opposing sides of said variable vane.

8. A variable vane assembly in accordance with Claim 6 further comprising a bushing extending circumferentially around at least a portion of said radially inner spindle, said bushing comprising a body and a base extending from said body and configured to facilitate preventing rotation of said bushing with respect to the variable vane.

9. A variable vane assembly in accordance with Claim 8 wherein said bushing base has a cross-sectional profile that is different than a cross-sectional profile of said bushing body.

10. A variable vane assembly in accordance with Claim 8 wherein at least a portion of said retainer extends through a portion of said bushing.

11. A variable vane assembly in accordance with Claim 6 wherein said retainer comprises a pair of opposed arms, each said arm configured to engage at least one machined face.

12. A variable vane assembly in accordance with Claim 6 wherein said retainer comprises a pair of opposed arms, at least one of said radially inner and radially outer spindles comprises a pair of opposed machined faces, each said arm configured to engage a respective one of said opposed machined faces such that said vane spindle is retained between said pair of opposed arms.

13. A variable vane assembly in accordance with Claim 6 wherein said retainer engages a groove defined on said radially inner spindle, said retainer configured to facilitate reducing bending moments induced to said radially outer spindle.

14. A gas turbine engine comprising:

a rotor comprising a rotor shaft and a plurality of rows of rotor blades;

a casing surrounding said rotor blades; and

a variable vane assembly comprising at least one row of circumferentially spaced variable vanes and a retainer assembly, said at least one row of variable vanes rotatably coupled to said casing and extending between an adjacent pair of said plurality of rows of rotor blades, each said variable vane comprising a radially inner spindle configured to rotatably couple said vane within said gas turbine engine, each of said radially inner spindles comprises at least one groove defined therein and comprising at least one machined face, said retainer assembly comprising at least one retainer for engaging each said spindle groove at least one machined face to securely couple each said variable vane within said gas turbine engine, each said retainer is configured to facilitate reducing wear of each of said variable vanes.

15. A gas turbine engine in accordance with Claim 14 further comprising an inner shroud extending substantially circumferentially between an adjacent pair of said plurality of rows of rotor blades, each said variable vane rotatably

coupled between said casing and said inner shroud, said at least one retainer extends through a portion of said inner shroud.

16. A gas turbine in accordance with Claim 15 wherein said variable vane assembly further comprises at least one bushing extending around each of said radially inner spindles, said at least one bushing comprising a base and a body extending from said base, said base configured to prevent rotation of said inner shroud with respect to said variable vane assembly.

17. A gas turbine engine in accordance with Claim 16 wherein said bushing base has a cross-sectional profile that is different than a cross-sectional profile of said bushing body, said inner shroud comprises a plurality of circumferentially spaced openings extending therethrough, a portion of each of said openings has a cross-sectional shape that is substantially identical to that of said bushing base.

18. A gas turbine engine in accordance with Claim 16 wherein at least a portion of said at least one retainer extends through said vane assembly at least one bushing.

19. A gas turbine engine in accordance with Claim 15 wherein said inner shroud comprises a plurality of circumferentially spaced stem openings and a plurality of circumferentially spaced retainer openings, said plurality of stem openings extending substantially radially through said inner shroud, each of said stem openings is sized to receive a portion of said radially inner spindle therein, said plurality of retainer openings extending at least partially substantially axially through said inner shroud, each of said retainer openings is sized to receive at least a portion of said at least one retainer therein.

20. A gas turbine engine in accordance with Claim 15 wherein each said radially inner spindle groove comprises a pair of opposed machined faces, each said face is substantially planar, said at least one retainer comprises a pair of opposed arms configured to engage each said groove face such that said radially inner spindle is retained between said retainer arms.